KUMARAGURU
college of technology
character is life

GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)

2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.

3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.

4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.

5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E DEGREE EXAMINATIONS: DEC 2015

(Regulation 2014)

Third Semester

COMPUTER SCIENCE AND ENGINEERING

U14CST301: Data Structures And Algorithms

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code   CO3 [K_2]

List I	List II
A. B-tree	i. Minimum value at root node
B. AVL tree	ii. Reverse polish
C. Heap	iii. Balance Factor
D. Postfix	iv. 2-3-4 tree

	A	B	C	D
a)	4	3	1	2
b)	4	2	3	1
c)	4	2	1	3
d)	4	3	2	1

2. In a linked list with n nodes, the time taken to insert an element after an element pointed by some pointer is   CO2 [K₂]

    a) 0 (1)   b) 0 (log n)

    c) 0 (n)   d) 0 (n 1og n)

3. The following numbers are inserted into an empty binary search tree in the given order: 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree?   CO1 [K₃]

    a) 2   b) 3

    c) 4   d) 6

4. The number of edges in a minimum spanning tree of a graph with 8 vertices is   CO1 [K₃]

    a) 7   b) 9

    c) 8   d) 10

5. Given the following input (4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199) and the hash function x mod 10, which of the following statements are true?   CO4 [K₃]

    i. 9679, 1989, 4199 hash to the same value

    ii. 1471, 6171 has to the same value

    iii. All elements hash to the same value

    iv. Each element hashes to a different value

    a) i only   b) ii only

    c) i and ii only   d) iii or iv

6. A sort which relatively passes through a list to exchange the first element with any element less than it and then repeats with a new first element is called.   CO5 [K₃]

    a) Insertion sort   b) Selection sort

    c) Heap sort   d) Quick sort.

7. Assertion (A): Stack is used in recursive programs.   CO3 [K₃]

    Reason (R): Stack uses first in first out principle

    a) Both A and R are individually true and R   b) Both A and R are individually true but
       is the correct explanation of A   R is not the correct explanation of A

    c) A is true but R is false   d) A is false but R is true

8. Which of the following sorting algorithm does not have a worst case running time of $O(n^2)$?   CO5 [K₂]

    a) Insertion sort   b) Merge sort

    c) Quick sort   d) Bubble sort

9. For the given postfix expression, find the correct sequence in which the following calculation takes place :   x y 5 z * /- 10 +   CO4 [K₃]

1. Multiplication
2. Addition
3. Division
4. Subtraction

a) 1,2,4,3   b) 1,3,4,2

c) 1,3,2,4   d) 2,4,3,1

10. Assertion (A): A tree with n nodes contains n-1 edges   CO1 [K$_2$]
    Reason (R): A tree contains cycle

a) Both A and R are individually true and R   b) Both A and R are individually true but
    is the correct explanation of A   R is not the correct explanation of A

c) A is true but R is false   d) A is false but R is true

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Compare array implementation of list with linked list implementation   CO3   [K$_2$]

12. List any four applications of queue.   CO4   [K$_2$]

13. Construct min heap for the following numbers.   CO4   [K$_3$]

    25,30,15,17,8,11

14. Give an example for threaded binary tree.   CO1   [K$_2$]

15. What is collision in hashing? List the collision resolution methods.   CO1   [K$_2$]

16. Show the results of inserting 2,1,4,5,9,3,6,7 into an initially empty AVL tree.   CO4   [K$_3$]

17. What is graph? List the graph representation methods.   CO1   [K$_2$]

18. List the applications of depth first search.   CO4   [K$_2$]

19. Compare internal and external sorting methods.   CO5   [K$_2$]

20. What is the worst and average case time complexity of sequential search?   CO2   [K$_2$]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. (i) Explain queue and its operations. Develop functions to implement all queue   (7)   CO4   [K$_3$]
        operations using link list.

(7)

    (ii) Evaluate the following postfix expression using stack.
       AB^CD-EF/GH+/+*
    Show the stack contents at each stage.

22. Develop functions to implement the following   CO1   [K₃]
    (i) To create a binary search tree   (3)
    (ii) To insert an element in the binary search tree   (4)
    (iii)To delete an element from the binary search tree (4)
    (iv)To search an element in the binary search tree.   (3)

23. Explain height balanced trees with examples. Write an algorithm to perform an   CO3   [K₂]
operation balanced insert.

24. (i) Write an algorithm for finding single source shortest path. Explain with an   (10) CO4   [K₃]
example.

    (ii) With an example explain topological sort   (4)

25. (i) Write an algorithm for quick sort. Sort the following numbers using quick sort.   (10) CO4   [K₃]
      5,3,1,9,8,2,4,7
   (ii) Write a recursive algorithm for binary search.   (4)

26. What is a spanning tree of a graph? Write and explain Prim's algorithm to find the   CO4   [K₂]
minimum spanning tree with an example graph.

****